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(54) **IMAGE PROCESSING APPARATUS, CONTROL METHOD THEREOF, AND STORAGE MEDIUM**

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G03G 15/00 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 15/5004*** (2013.01)
USPC **399/75**; 399/88

(58) **Field of Classification Search**
USPC 399/37, 75, 76, 77, 88
See application file for complete search history.

(56) **References Cited**

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6,895,196 B2 * 5/2005 Uchizono et al. 399/75
7,283,262 B2 * 10/2007 Takeda et al. 358/1.14

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* cited by examiner

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(57) **ABSTRACT**

The present invention provides an image processing apparatus for performing a process of transiting to a power-off state or sleep state in accordance with the connected state of an interface, a control method thereof, and a storage medium. To accomplish this, if a condition for changing the power state of this image processing apparatus is satisfied, the image processing apparatus confirms an interface which is able to communicate with an external apparatus, and determines whether the image processing apparatus can transit to the sleep state based on the confirmation result. If it is determined that the image processing apparatus transits to the sleep state, the image processing apparatus is transited to the sleep state. If it is determined that the image processing apparatus does not transit to the sleep state, the image processing apparatus is turned off.

9 Claims, 5 Drawing Sheets

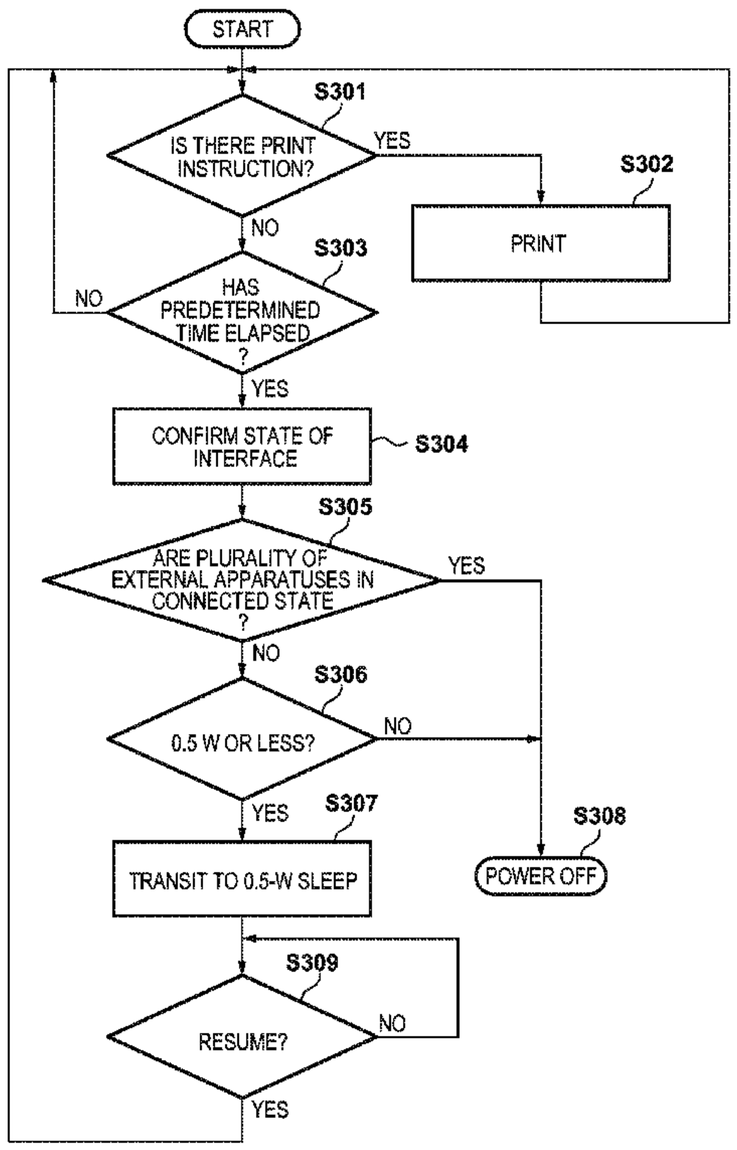


FIG. 1

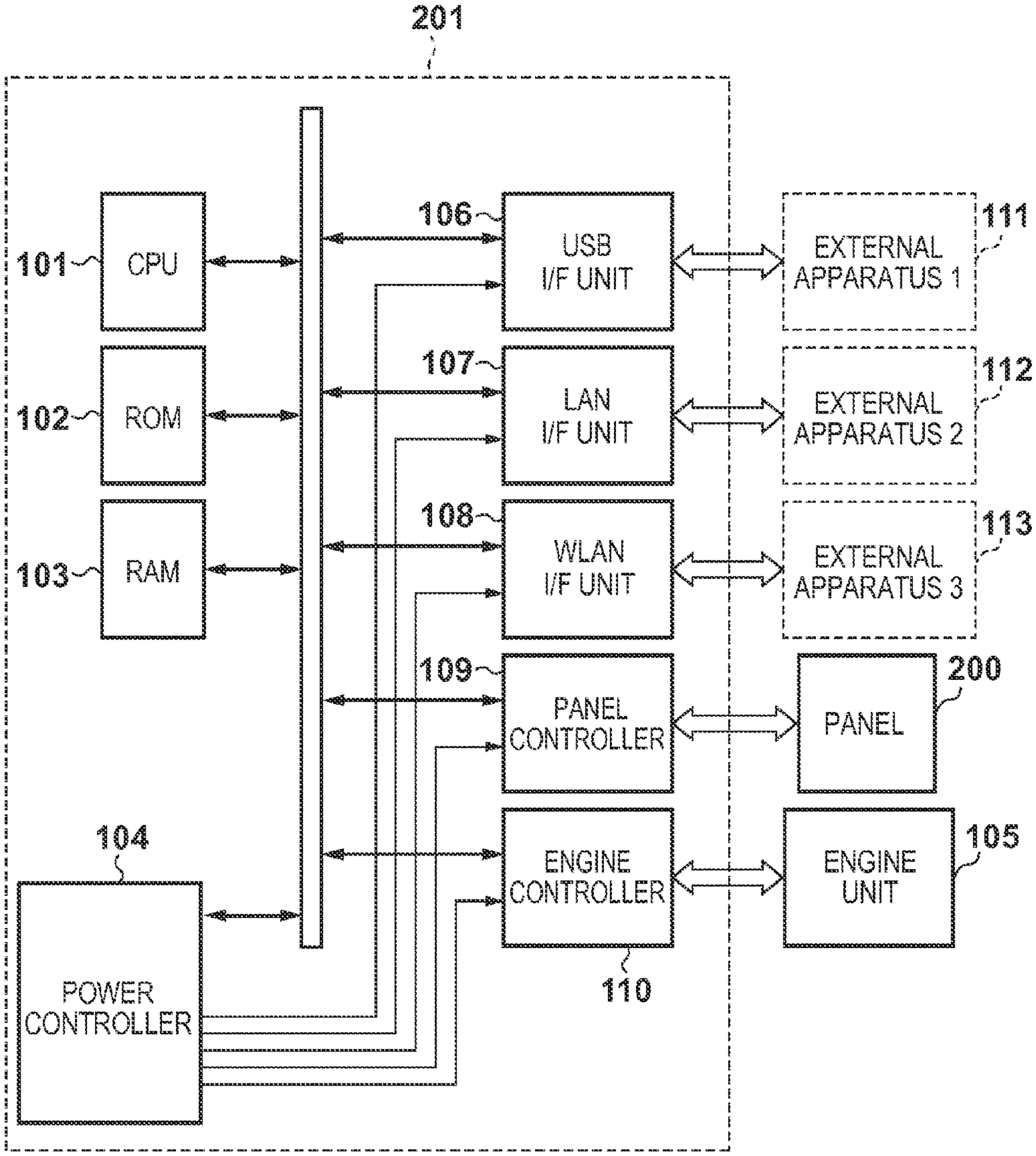
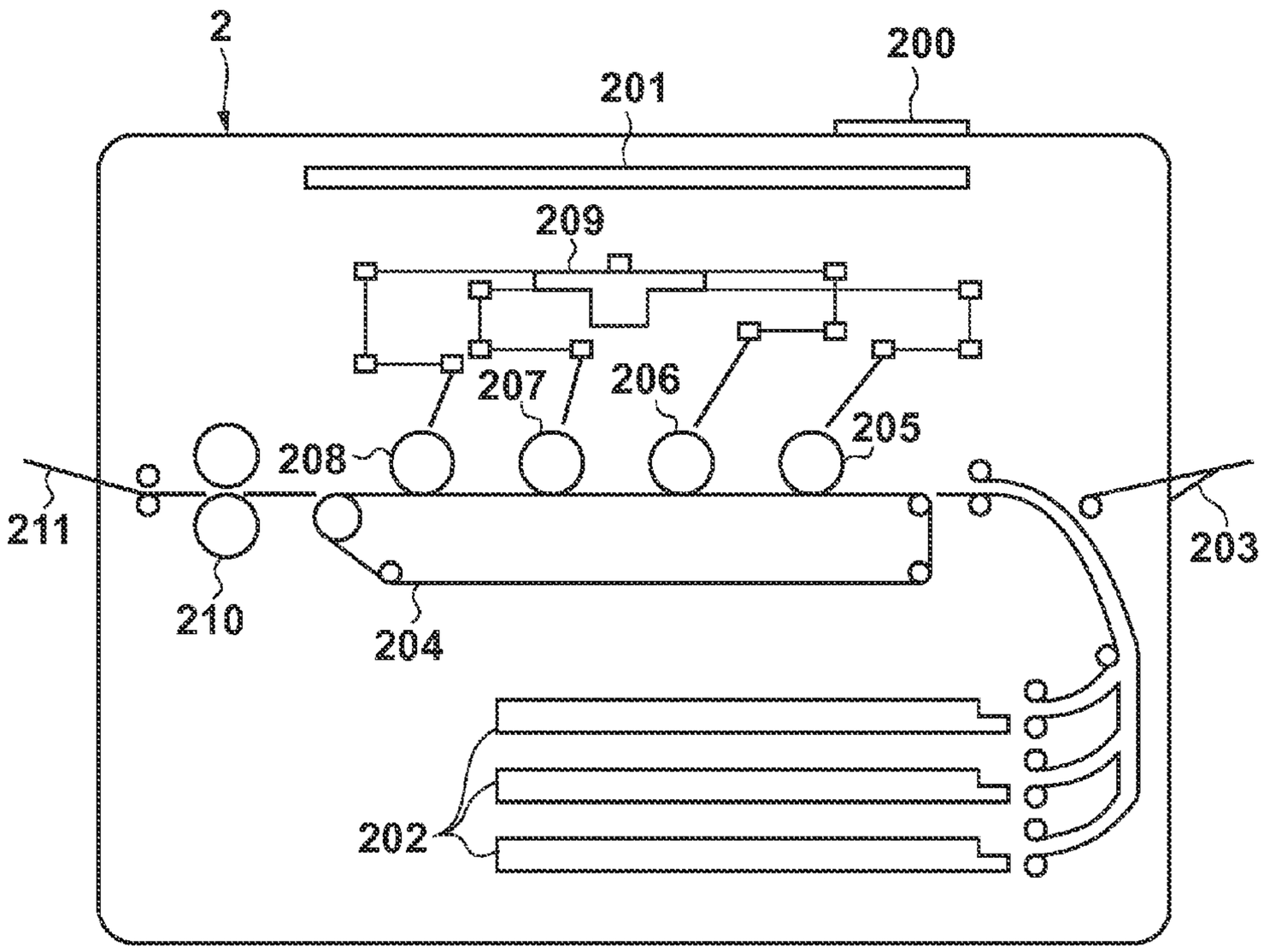

201
101
CPU
102
ROM
103
RAM
104
POWER CONTROLLER
106
USB I/F UNIT
107
LAN I/F UNIT
108
WLAN I/F UNIT
109
PANEL CONTROLLER
ENGINE CONTROLLER
110
111
EXTERNAL APPARATUS 1
112
EXTERNAL APPARATUS 2
113
EXTERNAL APPARATUS 3
200
PANEL
ENGINE UNIT
105

FIG. 2



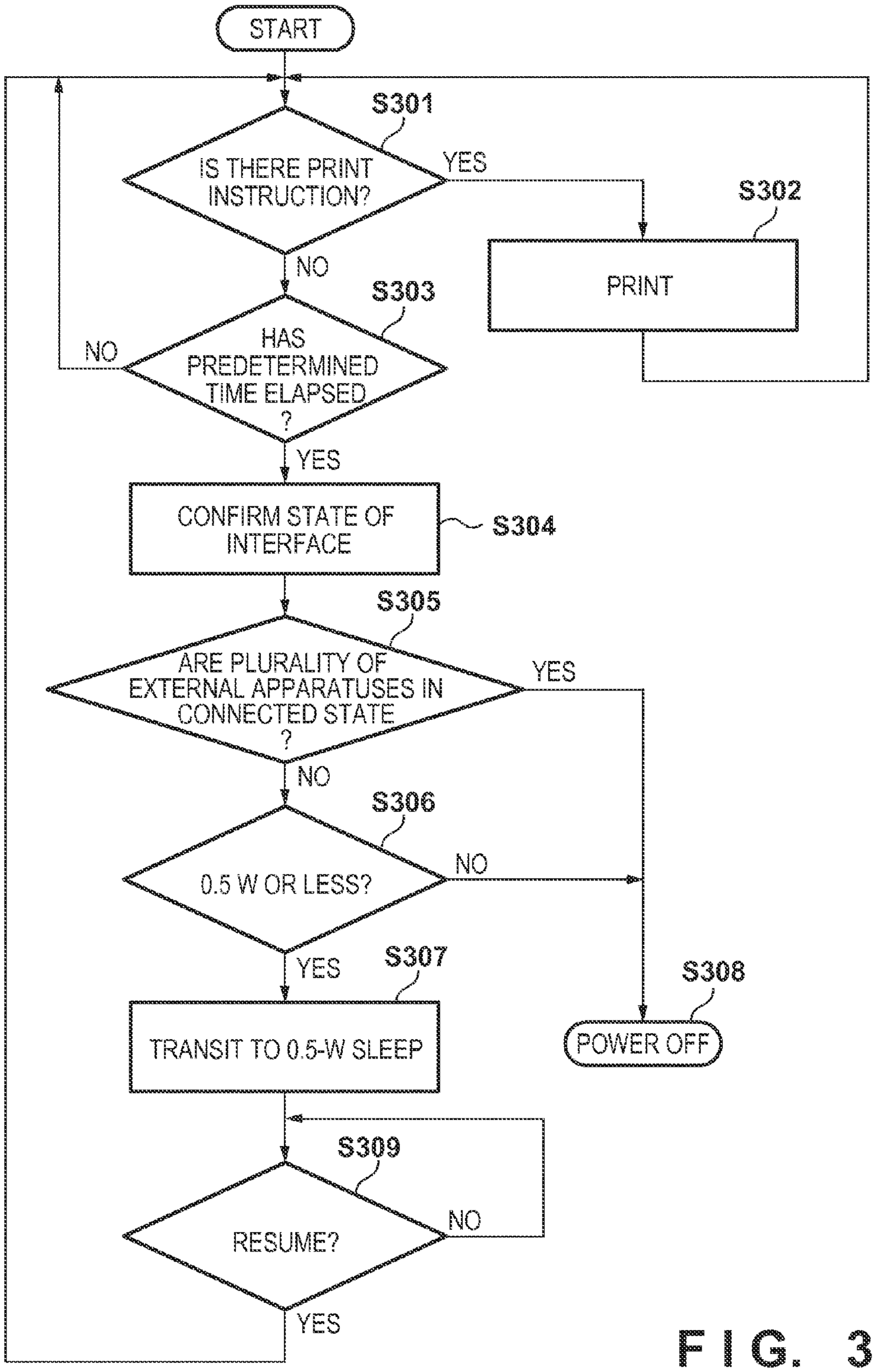

START
S301
IS THERE PRINT INSTRUCTION?
YES
NO
S302
PRINT
S303
HAS PREDETERMINED TIME ELAPSED ?
NO
YES
CONFIRM STATE OF INTERFACE
S304
S305
ARE PLURALITY OF EXTERNAL APPARATUSES IN CONNECTED STATE ?
YES
NO
S306
0.5 W OR LESS?
NO
YES
S307
TRANSIT TO 0.5-W SLEEP
S308
POWER OFF
S309
RESUME?
NO
YES

FIG. 3

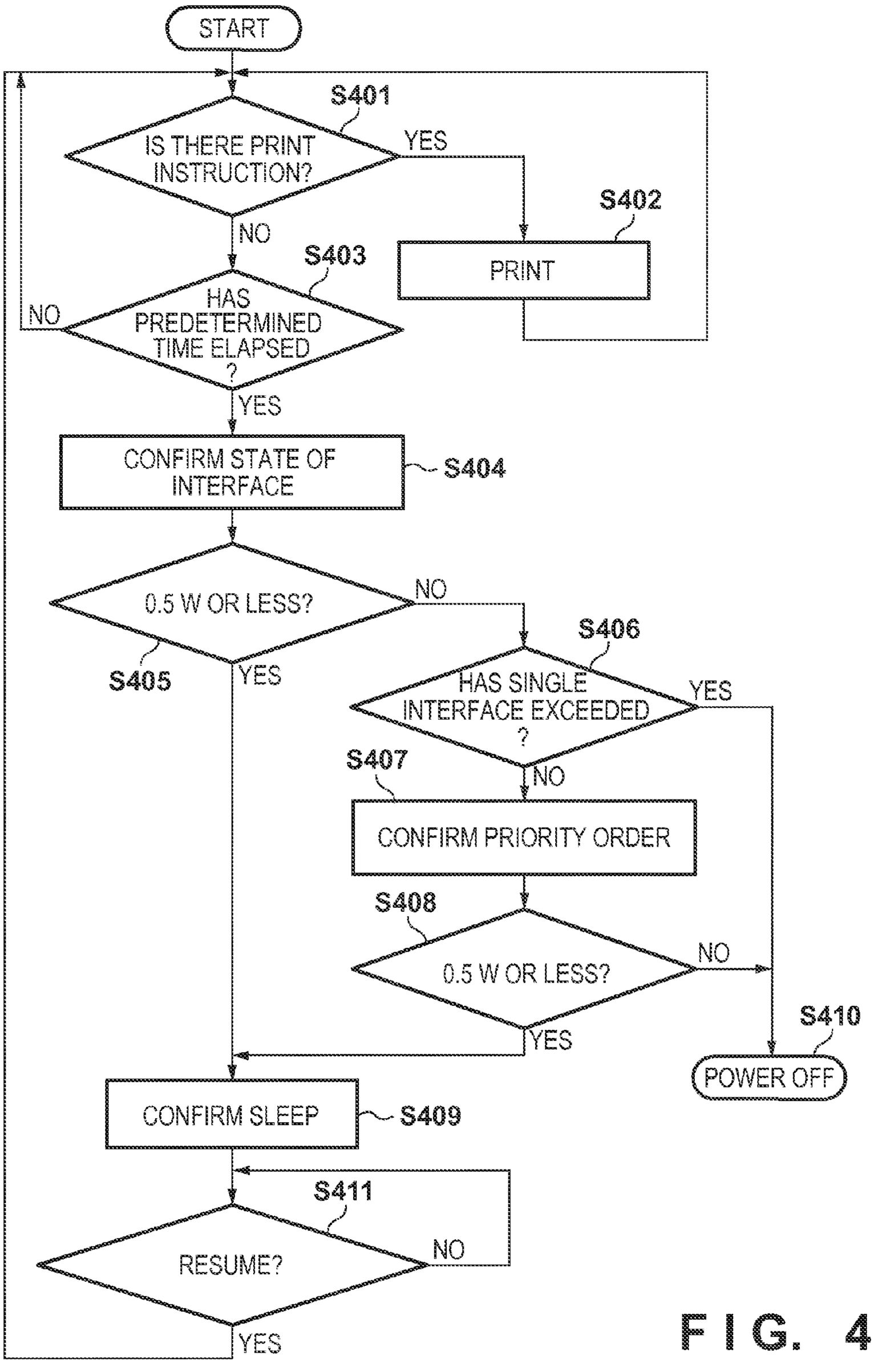

START
S401
IS THERE PRINT INSTRUCTION?
YES
S402
PRINT
NO
S403
HAS PREDETERMINED TIME ELAPSED ?
NO
YES
CONFIRM STATE OF INTERFACE
S404
0.5 W OR LESS?
NO
S405
YES
S406
HAS SINGLE INTERFACE EXCEEDED ?
YES
S407
NO
CONFIRM PRIORITY ORDER
S408
0.5 W OR LESS?
NO
YES
S410
POWER OFF
CONFIRM SLEEP
S409
S411
RESUME?
NO
YES

FIG. 4

FIG. 5

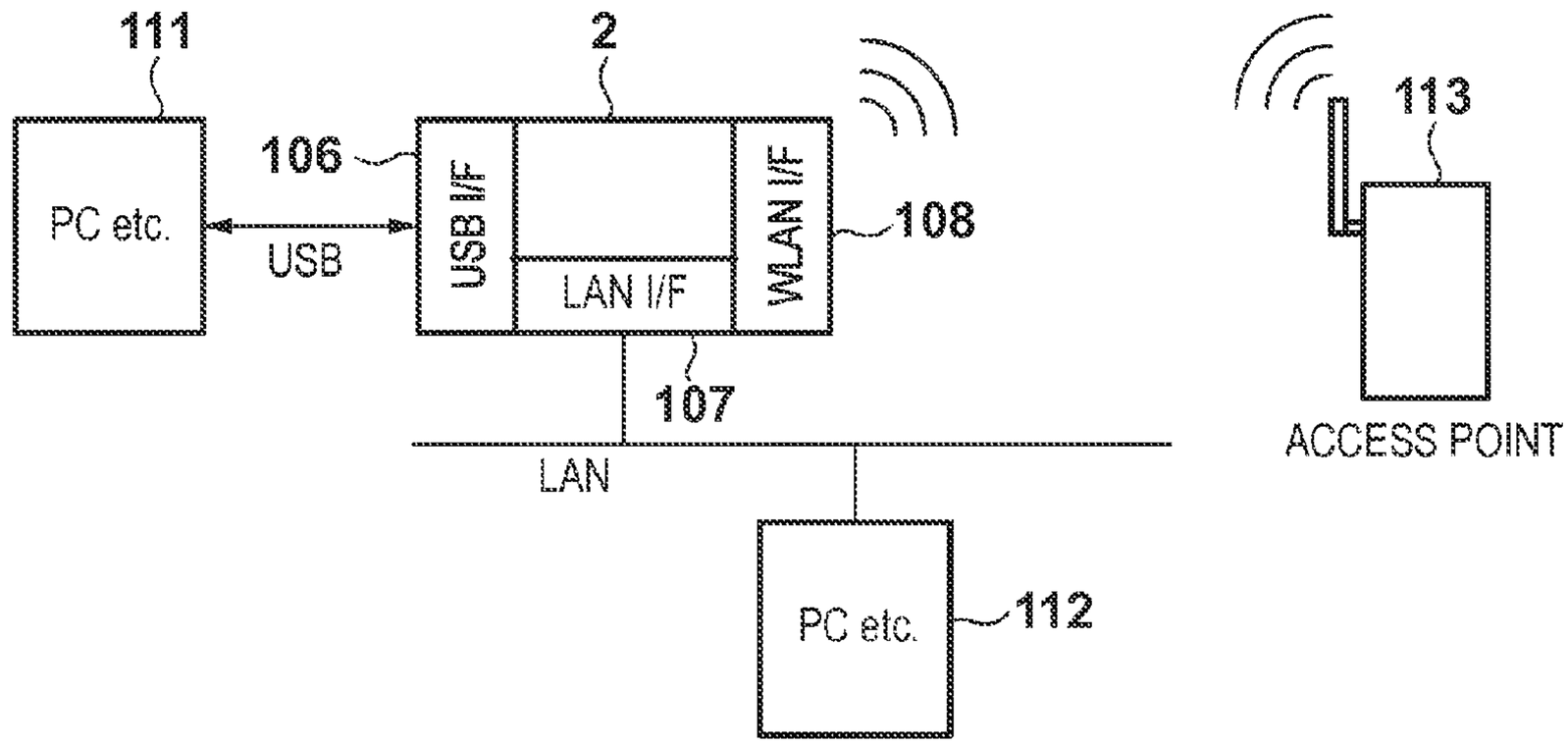


FIG. 6

601	602	603 (600)
CONNECTED STATE	0.5 W OR LESS	PRIORITY ORDER
USB	○	——
LAN	○	——
WLAN	×	——
USB+LAN	×	LAN
WLAN+USB	×	USB
WLAN+LAN	×	LAN
WLAN+LAN+USB	×	LAN

IMAGE PROCESSING APPARATUS, CONTROL METHOD THEREOF, AND STORAGE MEDIUM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an image processing apparatus having power saving control, a control method thereof, and a storage medium.

2. Description of the Related Art

Recently, computer peripheral devices including printers have been required to reduce the energy consumption from the viewpoint of global environment preservation. As the international standards, a peripheral device satisfying predetermined conditions is required to automatically transit to a low power consumption state. Accordingly, energy saving and user friendliness are important themes of device development.

Also, a device having an automatic power-off function in order to reduce the power consumption even in the lower power consumption state has been developed. Especially in recent years, energy saving leads to the saving of electricity charge and the reduction in CO_2 exhaustion amount, so users are taking a growing interest. In addition, enterprises cannot ignore energy saving as social responsibility regardless of the enterprise scales, and are extensively developing energy saving techniques.

As a method of controlling the transition to the lower power consumption state, Japanese Patent Laid-Open No. 2008-142942 has described a method of performing the control when a predetermined time has elapsed after a printing operation is stopped. In this method, a time zone in which no printing is performed is preset. When transiting to a sleep mode, the power source is turned off if the time is in this predetermined time zone; if not, the control transits to the sleep mode.

Unfortunately, the above-mentioned prior art has the following problems. In the above prior art, in the control of transiting to the sleep mode if no printing operation is performed for a predetermined time, a time zone during which no printing is performed is preset, and the power source is turned off if the time is in this predetermined time zone; if not, the control transits to the sleep mode. That is, when transiting to the sleep mode or power-off mode, a time zone during which no printing is performed is predetermined, and judgment is performed based on the range of this time zone alone.

Also, when the power source is once turned off, it takes a long time to return to a usable state, unlike when standing by in the sleep state. Especially when using a printer across a network, many users use the printer, so it is difficult to grasp the use statuses of all the users. In addition, some apparatuses consume high power when the power source is turned on or off. Therefore, the energy saving effect worsens if ON and OFF of the power source occur within a short time.

SUMMARY OF THE INVENTION

The present invention enables realization of an image processing apparatus that performs a process of transiting to a power-off state or sleep state in accordance with the connected state of an interface, a control method thereof, and a storage medium.

One aspect of the present invention provides an image processing apparatus comprising a plurality of interfaces for connecting an external apparatus, comprising: a confirmation unit configured to confirm, in a case where a condition for changing a power state of the image processing apparatus is satisfied, an interface which is able to communicate with an external apparatus; a determination unit configured to determine, based on a confirmation result by the confirmation unit, whether or not the image processing apparatus transits to a sleep state in which at least one of the plurality of interfaces is communicable; and a power control unit configured to transit the image processing apparatus to the sleep state if the determination unit has determined that the image processing apparatus transits to the sleep state, and transit the image processing apparatus to a power-off state in which the plurality of interfaces are incommunicable if the determination unit has determined that the image processing apparatus does not transit to the sleep state.

Another aspect of the present invention provides a control method for an image processing apparatus comprising a plurality of interfaces for connecting an external apparatus, comprising: confirming, by a confirmation unit, in a case where a condition for changing a power state of the image processing apparatus is satisfied, an interface which is able to communicate with an external apparatus; determining, by a determination unit, based on a confirmation result by the confirmation unit, whether or not the image processing apparatus transits to a sleep state in which at least one of the plurality of interfaces is communicable; and controlling, by a power control unit, to transit the image processing apparatus to the sleep state if the determination unit has determined that the image processing apparatus transits to the sleep state, and transit the image processing apparatus to a power-off state in which the plurality of interfaces are incommunicable if the determination unit has determined that the image processing apparatus does not transit to the sleep state.

Still another aspect of the present invention provides a computer-readable storage medium storing a computer program for causing a computer to execute each step in a control method for an image processing apparatus.

Further features of the present invention will be apparent from the following description of exemplary embodiments with reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a view showing the configuration of a printing system according to the first embodiment;

FIG. **2** is a sectional view showing an outline of the structure of a printing apparatus according to the first embodiment;

FIG. **3** is a flowchart according to the first embodiment;

FIG. **4** is a flowchart according to the second embodiment;

FIG. **5** is a view showing connections to external apparatuses according to the first embodiment; and

FIG. **6** is a management table showing the electric power and priority order according to the first embodiment.

DESCRIPTION OF THE EMBODIMENTS

Embodiments of the present invention will now be described in detail with reference to the drawings. It should be noted that the relative arrangement of the components, the numerical expressions and numerical values set forth in these embodiments do not limit the scope of the present invention unless it is specifically stated otherwise.

<First Embodiment>

<Arrangement of Image Processing Apparatus>

The first embodiment of the present invention will be explained below with reference to FIGS. **1** to **3** and **5**. Frist, an arrangement example of a printer **2** as an image processing apparatus according to this embodiment will be explained

with reference to FIG. **2**. As shown in FIG. **2**, the printer **2** includes an operation panel **200**, a printer control unit **201**, a paper feed cassette **202**, a manual feed tray **203**, a paper convey unit **204**, developing units **205** to **208**, a laser scanner unit **209**, a fixing unit **210**, and a paper discharge tray **211**.

The printer **2** receives data from various external apparatuses such as host computers, and executes printing on a printing medium. In this embodiment, a laser beam printer is applied to the printer **2**. However, the present invention is not limited to this, and applicable to any image processing apparatus connectable to a network.

The printer **2** receives print information (for example, a character code), form pattern information, or compressed image data supplied from a connected external host computer. The input image data is stored, and a corresponding character pattern or form pattern is formed in accordance with the information, or an image is formed on printing paper as a printing medium while the compressed image data is rasterized.

The operation panel **200** includes switches and LED indicators for various operations. The printer control unit (controller) **201** executes overall control in the printer **2**, and analyzes character information and the like supplied from a host computer or the like. The printer control unit **201** mainly converts character information into a video signal having a corresponding character pattern, and transfers compressed image data to the laser scanner unit **209** while rasterizing the data.

When printing is started, the printer **2** starts a paper feed operation of feeding printing paper into the apparatus from the paper feed cassette **202** or manual feed tray **203**. The printing paper thus fed is fed to the paper convey unit **204**, and conveyed so as to sequentially pass through the developing units **205**, **206**, **207**, and **208**. At the same time, the image data of different colors rasterized by the printer control unit **201** are subjected to an image conversion process, and supplied to the laser scanner unit **209**.

The laser scanner unit **209** is a circuit for driving a semiconductor laser, and switches ON and OFF of a laser beam emitted from the semiconductor laser in accordance with input image data. Electrostatic latent images are formed on photosensitive drums of the developing units **205**, **206**, **207**, and **208** based on the image data of different colors supplied to the laser scanner unit **209**, and the images are developed in accordance with the individual colors, thereby forming desired color images (developer images).

By synchronizing the formation of the image data of different colors with the conveyance of the printing paper, color images of different colors are transferred onto the printing paper conveyed by the paper convey unit **204**. Also, a sensor for sensing the residual amount of toner is attached to each of the developing units **205**, **206**, **207**, and **208**, and each sensor supplies information to the control system of the printing section in accordance with the reduction in toner. The fixing unit **210** thermally fixes the color images thus printed on the printing paper, and discharges the printing paper to the paper discharge tray **211**. In the arrangement of the printer **2** as described above, a printed image can be obtained at very high speed because each color can independently be developed.

<Arrangement of Printer Control Unit>

Details of an arrangement example of the printer control unit **201** in the above-described printer **2** will be explained below with reference to FIG. **1**. As shown in FIG. **1**, the printer control unit **201** includes a CPU **101**, ROM **102**, RAM **103**, power controller **104**, USB I/F unit **106**, LAN I/F unit **107**, WLAN I/F unit **108**, panel controller **109**, and engine controller **110**.

The interface units **106**, **107**, and **108** are connected to external apparatuses (for example, host computers), and receive code data and compressed image data from external apparatuses **111** to **113**. In accordance with the types of interfaces, the interface units **106** to **108** include independent I/F units, that is, the USB I/F unit **106**, LAN I/F unit **107**, and WLAN I/F unit **108**.

The CPU **101** executes a control program stored in the ROM **102**, and comprehensively controls the printer **2**. The RAM **103** provides an area for storing printing data to be printed supplied from the host computers, and provides, as a work memory, a work area required when the CPU **101** executes various control operations. The ROM **102** stores various programs (firmware) to be executed by the CPU **101**.

The interface units **106** to **108** are connected by interface cables, and exchange control signals and data with the host computers. Data reception is performed by storing image data transferred from the host computer in the RAM **103**, and transferring the stored data to the engine controller **110** when printing the data. The engine controller **110** outputs the image data transferred from the RAM **103**, in response to a sync signal supplied from the engine unit **105**. The panel controller **109** controls information to be displayed on the panel **200**, and monitors information of the switches and the like on the panel **200**.

The power controller **104** manages the power source of the whole apparatus by monitoring ON/OFF of the main power switch, and controls power supply to each portion of the printer control unit **201**. The printer **2** according to this embodiment is controlled to, for example, a standby state, sleep state, or power-off state, as a power control state set by the power controller **104**. The standby state is a state in which the printer **2** is activated, printing is immediately executable when a print instruction or the like is received, and electric power is supplied to each device shown in FIG. **1**. The power-off state is a state in which power supply to each device shown in FIG. **1** is stopped. The sleep state is a power saving state which is set when no processing is performed for a predetermined time, and in which power is supplied to only minimum necessary devices. Note that the printer **2** according to this embodiment may also be controlled to a suspended state or hibernation state. The suspended state is a state in which power supply to the RAM **103** is maintained and power supply to devices other than the RAM **103** is stopped, and the printer **2** can be activated at high state based on status information stored in the RAM **103**. The hibernation state is a state in which power supply to each device shown in FIG. **1** is stopped, as in the power-off state. In this hibernation state, high-speed activation is possible based on status information stored in a hard disk drive (not shown). In the sleep state, the printer **2** according to this embodiment supplies power to only an interface unit in a connected state. Accordingly, communication from an external apparatus in the connected state can be accepted even in the sleep state. Note that the present invention is not limited to this control, and a device to which power is supplied in the sleep state can be changed in accordance with the specifications of a system in which the printer **2** is installed. Note also that the purpose of the printer **2** according to this embodiment is to achieve a predetermined power or less in the sleep state, so power supply can be performed for any device as long as the predetermined power or less can be achieved.

<Interface>

Next, the connection environment between the printer **2** and external apparatuses will be explained with reference to FIG. **5**. The external apparatuses **111** to **113** are connected to the interfaces on the printer control unit **201**. For example,

when connecting an external apparatus by using a USB, the external apparatus **111** is connected to the USB I/F unit **106** by using a USB cable. Consequently, printing can be performed by receiving image data from the external apparatus **111**. Similarly, when connecting an external apparatus by using a LAN, the external apparatus **112** is connected to the LAN I/F unit **107**. When connecting an external apparatus by using a WLAN, the external apparatus **113** is connected to the WLAN I/F unit **108**. As a consequence, the printer **2** can perform printing by receiving image data from the external apparatuses **112** and **113**.

<Power Saving Control>

The procedure of power saving control in this embodiment will be explained below with reference to FIG. **3**. Processing to be explained below is controlled by the CPU **101** and various programs (firmware) stored in the ROM **102**.

When the printer has completed printing, the CPU **101** determines in step S**301** whether there is a next print instruction from an external apparatus (for example, a host computer). If there is a print instruction, the process advances to step S**302**, and the CPU **101** starts the next printing. When the printing is complete, the process returns to step S**301**.

On the other hand, if there is no printing instruction in step S**301**, the process advances to step S**303**, and the CPU **101** determines whether an elapsed time from the completion of printing has exceeded a preset time. If the elapsed time has not exceeded the preset time, the process returns to step S**301**, and the CPU **101** determines whether there is a print instruction. That is, in this step, the CPU **101** determines whether an elapsed time from the execution of last processing in the printer **2** has exceeded a predetermined time. A condition for clearing a counter that counts the elapsed time in step S**303** includes an operation such as cartridge exchange or door open. Note that in step S**301**, whether the elapsed time has exceeded the preset time is determined. In the present invention, however, it is also possible to determine whether a condition for changing the power state of the image processing apparatus is satisfied. Examples of the condition for changing the power state are a predetermined time, and the remote-controlled reception of a shutoff command from an external apparatus.

If the elapsed time has exceeded the preset time in step S**303**, the process advances to step S**304**, and the CPU **101** confirms which of the USB I/F unit **106**, LAN I/F unit **107**, and WLAN I/F unit **108** is presently in a connected state. After that, the process advances to step S**305**. "An external apparatus is in a connected state" indicates a state in which the printer **2** is connected to the external apparatus so that communication is possible between them. That is, if an external apparatus is merely physically connected, the external apparatus is not necessarily in the connected state. In step S**305**, the CPU **101** determines whether a plurality of external apparatus are in the connected state, in accordance with the confirmation result in step S**304**. If a plurality of external apparatuses are in the connected state, the process advances to step S**308**, and the CPU **101** performs a shutdown process. The power controller **104** then automatically turns off the main power source of the apparatus itself, thereby shutting down the power source for the whole printer **2**.

On the other hand, if a plurality of external apparatuses are not in the connected state, that is, if one external apparatus is in the connected state, the process advances to step S**306** and the CPU **101** determines which interface is in the connected state. In addition, in accordance with the interface in the connected state, the CPU **101** determines whether it is possible to transit to a 0.5-W (Watt) sleep state (to be abbreviated as 0.5-W sleep hereinafter). In the printer **2** according to this embodiment, information indicating whether the sleep power can be set at 0.5 W or less is prestored in the ROM **102**, and whether to transit to 0.5-W sleep or turn off the power source is determined based on this information. For example, necessary power when each interface is in the connected state is defined in the information. By referring to this information, the CPU **101** can calculate minimum necessary power by using information of the interface in the connected state as well. In this step, whether it is possible to transit to the 0.5-W sleep state is determined. However, the present invention is not limited to this, and it is also possible to perform determination equivalent to step S**306** by confirming the types or number of interfaces. For example, it is possible to transit to the power-off state (a second power state) for a USB connection, and transit to the sleep state (a first power state) for a LAN connection. Alternatively, it is possible to transit to the power-off state (second power state) if there are two or more connections, and transit to the sleep state (first power state) if there is one or less connection. If there are two or more connections, it is also possible to make a predetermined interface communicable, and turn off the power sources of other interfaces. For example, if both the USB and LAN are in the connected state when the interface states are confirmed in step S**304**, it is possible to maintain the connected state of the LAN as a predetermined interface, and set the USB in the power-off state.

If only the WLAN I/F unit **108** is in the connected state in step S**306**, the CPU **101** determines that the electric power will exceed 0.5 W in the sleep state by referring to the information in the ROM **102**. Therefore, the CPU **101** advances the process to step S**308**, and turns off the power source. On the other hand, if only the LAN I/F unit **107** is in the connected state, the CPU **101** determines that 0.5-W sleep is possible, and advances to step S**307**.

In step S**307**, the CPU **101** causes the power controller **104** to stop power supply to the interface units except for the LAN I/F unit **107**, and simultaneously changes the LAN I/F unit **107** to minimum necessary power supply, thereby transiting to 0.5-W sleep. After that, the process advances to step S**309**. Also, the CPU **101** stops power supply to the engine controller **110**, and stops power supply to the panel controller **109** except for a switch for resumption from sleep. In step S**309**, the CPU **101** maintains the sleep state until a print instruction from the LAN I/F **107** or an instruction from the resuming switch of the panel is received. When the resuming instruction is received, the process returns to step S**301**.

As has been explained above, the image processing apparatus according to this embodiment confirms the connected state of each interface when a predetermined time has elapsed after printing is complete (after image processing is complete), and determines whether it is possible to transit to 0.5-W sleep in which a power state of 0.5 W or less is maintained. If the transition to 0.5-W sleep is possible, the image processing apparatus executes sleep control for transiting to the sleep state. If the transition to 0.5-W sleep is impossible, the image processing apparatus turns off the power source. Consequently, the image processing apparatus according to this embodiment can execute power saving control more effectively. For example, it is possible to reduce unnecessary turning-off of the power source, thereby reducing an unnecessary power consumption and unnecessary standby time caused by reboot.

Note that in this embodiment, power saving control as explained with reference to FIG. **3** is executed when the predetermined time has elapsed after printing is complete. However, the present invention is not limited to this control. For example, power saving control may also be performed if

a time during which no processing is performed has exceeded a predetermined time in the image processing apparatus of the present invention. Also, 0.5 W is used as the reference condition for transition to the sleep state in this embodiment, but this is merely an example. That is, the transition condition can be changed in accordance with a system in which the image processing apparatus is installed.

<Second Embodiment>

The second embodiment of the present invention will be explained below with reference to FIGS. **4** and **6**. In the above-mentioned embodiment, the connected states of the interfaces are confirmed, and, if a plurality of external apparatuses are in the connected state, it is determined that the condition of 0.5-W sleep cannot be satisfied, and the power source is turned off. In this embodiment, however, even when a plurality of external apparatuses are in the connected state, the priority order is given to the interfaces such that a specific interface is kept connected and other interfaces are disconnected, thereby transiting to a sleep mode. Note that an explanation of the same components and control operations as those of the above-mentioned first embodiment will be omitted.

<Power Saving Control>

The procedure of power saving control according to this embodiment will be explained below with reference to FIGS. **4** and **6**. The processing to be explained below is controlled by a CPU **101** and various programs (firmware) stored in a ROM **102**. Note that processes in steps S**401** to S**404** are the same as those in steps S**301** to S**304** of FIG. **3**, so an explanation thereof will be omitted.

In step S**405**, the CPU **101** determines whether it is possible to transit to sleep at 0.5 W or less, regardless of the number of interfaces in the connected state. More specifically, the CPU **101** refers to a management table **600** shown in FIG. **6** stored in the ROM **102**, and determines whether 0.5-W sleep can be achieved. If 0.5-W sleep cannot be achieved, the process advances to step S**406**. If 0.5-W sleep can be achieved, the process advances to step S**409**. Note that in this embodiment, determination processes in steps S**406** to S**408** (to be described later) are performed if 0.5-W sleep cannot be achieved. However, it is also possible to advance to step S**410** without performing these determination processes, and turns off a printer **2**.

The management table **600** shown in FIG. **6** will be explained below. The management table **600** defines a connected state **601**, 0.5 W or less **602**, and priority order **603** by associating them with each other. The connected state **601** defines a combination of interfaces in the connected state. The 0.5 W or less **602** defines information indicating whether 0.5 W or less can be achieved by an interface in the connected state **601**. For example, FIG. **6** defines that 0.5 W or less can be achieved when the connected state **601** is a USB or LAN, and cannot be achieved for other interfaces or other combinations.

The priority order **603** defines information of an interface whose connected state is to be given priority, in an item for which a plurality of interfaces are in the connected state. Therefore, no information of the priority order is defined for a single interface. Referring to FIG. **6**, when the connected state **601** is USB+LAN, that is, when a USB (USB I/F unit **106**) and a LAN (LAN I/F unit **107**) are in the connected state, the connected state of the LAN designated in the priority order **603** is preferentially maintained.

Referring back to FIG. **4**, in step S**406**, the CPU **101** determines whether a single connection has exceeded 0.5 W. If even a single connection cannot satisfy 0.5 W, the process advances to step S**410**, and the CPU **101** turns off the printer **2**. On the other hand, the process advances to step S**407** if 0.5 W cannot be satisfied when a plurality of external apparatuses are in the connected state.

In step S**407**, the CPU **101** confirms the priority order by referring to the management table **600** stored in the ROM **102**. Note that the user can freely set the priority order in the management table **600**. An operation when, for example, the USB and LAN are in the connected state will be explained below.

When the USB and LAN are in the connected state, the CPU **101** refers to the management table, and determines that the LAN is an interface when transiting to sleep, because the LAN is preset in the priority order **603**.

In step S**408**, the CPU **101** confirms power consumption when sleep is set for the LAN based on the management table shown in FIG. **6**, and determines to switch to a single connection of the LAN because the power consumption is 0.5 W or less. In this step, since the 0.5 W or less **602** in the management table **600** defines that the LAN can achieve 0.5 W or less, the CPU **101** determines that 0.5 W or less is possible, and advances to step S**409**. If the management table **600** defines that the LAN cannot achieve 0.5 W or less, the CPU **101** advances the process to step S**410**, and turns off the printer **2**.

In step S**409**, the CPU **101** causes a power controller **104** to stop power supply to the interface units except for the LAN I/F unit **107**, and changes the LAN I/F unit **107** to minimum necessary power supply. Note that if the process advances to step S**409** from the determination in step S**408**, power supply to the USB I/F unit **106** in the connected state is stopped. In this embodiment as described above, even when a plurality of external apparatuses are in the connected state, power supply to a given interface in the connected state is stopped in accordance with the predetermined priority order, unlike in the above-mentioned first embodiment. In addition, power supply to an engine controller **110** is also stopped, and power supply to a panel controller **109** is stopped except for a switch for resumption from sleep. In step S**411**, the CPU **101** maintains the sleep state until a print instruction from the LAN I/F unit **107** or an instruction from the resuming switch of the panel is received. When the resuming instruction is received, the process returns to step S**401**.

As has been explained above, the image processing apparatus according to this embodiment determines, when performing power saving control, whether 0.5 W or less can be achieved from the present connected state in accordance with the management table. In addition, if 0.5 W or less cannot be achieved when a plurality of external apparatuses are in the connected state, this image processing apparatus determines whether 0.5 W or less can be achieved by stopping power supply to a given external apparatus in accordance with the priority order. Accordingly, the image processing apparatus according to this embodiment can execute power saving control more effectively. For example, it is possible to reduce unnecessary turning-off of the power source, thereby reducing an unnecessary power consumption and unnecessary standby time caused by reboot.

Other Embodiments

Aspects of the present invention can also be realized by a computer of a system or apparatus (or devices such as a CPU or MPU) that reads out and executes a program recorded on a memory device to perform the functions of the above-described embodiment(s), and by a method, the steps of which are performed by a computer of a system or apparatus by, for example, reading out and executing a program recorded on a memory device to perform the functions of the above-described embodiment(s). For this purpose, the program is pro-

vided to the computer for example via a network or from a recording medium of various types serving as the memory device (for example, computer-readable medium).

While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures and functions.

This application claims the benefit of Japanese Patent Application No. 2012-031042 filed on Feb. 15, 2012, which is hereby incorporated by reference herein in its entirety.

What is claimed is:

1. An image processing apparatus comprising a plurality of interfaces for connecting an external apparatus, comprising:

a confirmation unit configured to confirm, in a case where a condition for changing a power state of the image processing apparatus is satisfied, an interface which is able to communicate with an external apparatus;

a determination unit configured to determine, based on a confirmation result by said confirmation unit, whether or not the image processing apparatus transits to a sleep state in which at least one of the plurality of interfaces is communicable; and

a power control unit configured to transit the image processing apparatus to the sleep state if said determination unit has determined that the image processing apparatus transits to the sleep state, and transit the image processing apparatus to a power-off state in which the plurality of interfaces are incommunicable if said determination unit has determined that the image processing apparatus does not transit to the sleep state.

2. The apparatus according to claim **1**, wherein said determination unit determines that the image processing apparatus does not transit to the sleep state if a plurality of interfaces in the connected state exist.

3. The apparatus according to claim **1**, further comprising a storage unit configured to store power consumption in the sleep state for each of the plurality of interfaces,

wherein said determination unit determines that the image processing apparatus transits to the sleep state in a case where only one interface is in the connected state and a power consumption of the one interface in the sleep state is not more than a predetermined power value.

4. The apparatus according to claim **1**, further comprising a storage unit configured to store information indicating whether an operation at not more than a predetermined power is possible in the sleep state, for each interface in the connected state and each combination of a plurality of interfaces in the connected state,

wherein said determination unit determines that the image processing apparatus transits to the sleep state if an interface in the connected state confirmed by said confirmation unit is defined, in said storage unit, as operable at not more than the predetermined power, and determines that the image processing apparatus does not transit to the sleep state if the interface is defined, in said storage unit, as inoperable at not more than the predetermined power.

5. The apparatus according to claim **4**, wherein

said storage unit further stores, for each interface in the connected state and each combination of a plurality of interfaces in the connected state, a priority order of a plurality of interfaces for a combination of the plurality of interfaces, and

said determination unit determines whether an interface in the connected state confirmed by said confirmation unit is a combination of a plurality of interfaces, if the interface in the connected state is defined, in said storage unit, as inoperable at not more than the predetermined power,

determines that the image processing apparatus does not transit to the sleep state if the interface is a single interface, and

refers to the priority order in said storage unit if the interface is a combination of a plurality of interfaces, determines that the image processing apparatus transits to the sleep state if an interface designated as an interface whose connected state is to be preferentially maintained is operable at not more than the predetermined power, and determines that the image processing apparatus does not transit to the sleep state if the interface designated as an interface whose connected state is to be preferentially maintained is inoperable at not more than the predetermined power.

6. The apparatus according to claim **5**, wherein if said determination unit determines that the transition to the sleep state in which the image processing apparatus operates at not more than a predetermined power is possible, said power control unit stops power supply to an interface, among the plurality of interfaces in the connected state, which is not designated as an interface whose connected state is to be preferentially maintained, thereby transiting the image processing apparatus to the sleep state.

7. The apparatus according to claim **1**, wherein

the plurality of interfaces comprise a LAN interface and a USB interface, and

said power control unit performs transition to a sleep state in which said LAN interface is communicable and said USB interface is incommunicable, if said determination unit has determined that the image processing apparatus transits to the sleep state, and performs transition to a power-off state in which both of said LAN interface and said USB interface are incommunicable, if said determination unit has determined that the image processing apparatus does not transit to the sleep state.

8. A control method for an image processing apparatus comprising a plurality of interfaces for connecting an external apparatus, comprising:

confirming, by a confirmation unit, in a case where a condition for changing a power state of the image processing apparatus is satisfied, an interface which is able to communicate with an external apparatus;

determining, by a determination unit, based on a confirmation result by the confirmation unit, whether or not the image processing apparatus transits to a sleep state in which at least one of the plurality of interfaces is communicable; and

controlling, by a power control unit, to transit the image processing apparatus to the sleep state if the determination unit has determined that the image processing apparatus transits to the sleep state, and transit the image processing apparatus to a power-off state in which the plurality of interfaces are incommunicable if the determination unit has determined that the image processing apparatus does not transit to the sleep state.

9. A computer-readable storage medium storing a computer program for causing a computer to execute each step in a control method for an image processing apparatus cited in claim **8**.

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